HIGH-TEMPERATURE THERMOMECHANICAL TREATMENT OF SINTERED TITANIUM-SILICEOUS CARBIDE Ti_3SiC_2

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The purpose of work: to study opportunities of a thermomechanical treatment of titanium-siliceous carbide Ti_3SiC_2 which is capable to provide raising the low-temperature plasticity and high-temperature strength.

It is investigated titanium-siliceous carbide Ti_3SiC_2 received by sintering, in a compact state with a grain size 5-15 microns.

Samples in diameter of 5 mm and height 5 mm were exposed to thermomechanical treatment in the way single-axis compression in vacuum in temperatures interval 1000-1300 ^oC and deformation 5-50 %. Effect of thermomechanical treatment defined by single-axis compression and macrohardness measurements (P=10 N) methods at temperatures 20-1200 ^oC, and also by raster electronic microscopy method.

Regularities, features and micromechanisms of strain, strengthening and fracture, and also formation of structure of this material are investigated during high-temperature deformation. So, deformation at 1300 ^oC on 20 % results in reduction of the grain size up to 2-3 microns. Such material has values of hardness at 20-1200 ^oC in 1,5-2 times above in comparison with initial.

Temperature-strain-power boundaries existence of titanium-siliceous carbide Ti_3SiC_2 in a plastic state are established. The optimum conditions of thermomechanical treatment providing simultaneous increase of low-temperature plasticity and high-temperature strength are determined.

The received results allow to develop physical bases of thermomechanical treatment of the new class materials - nanolaminates, directed on increase of a complex their mechanical and technological properties.